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मानक

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IS 11654-3-408 (1989): Flexible insulating sleeving, Part 3: Specifications for individual type of sleeveings, Section 408: Glass textile sleeving with PVC based coating-lower breakdown strength [ETD 2: Solid Electrical Insulating Materials and Insulation Systems]



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“Knowledge is such a treasure which cannot be stolen”



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*Indian Standard*

# SPECIFICATION FOR FLEXIBLE INSULATING SLEEVING

## PART 3 SPECIFICATIONS FOR INDIVIDUAL TYPES OF SLEEVINGS

### Section 408 Glass Textile Sleaving with PVC Based Coating — Lower Breakdown Strength

भारतीय मानक

नम्य विद्युत्तरोधन स्लीविंग

भाग 3 अलग-अलग स्लीविंग — विशिष्ट

अनुभाग 408 पी बी सी आधारित लेपनयुक्त निम्न भंजन सामर्थ्य वाली काँच-वस्त्रादि की स्लीविंग

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BUREAU OF INDIAN STANDARDS  
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NEW DELHI 110002

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Price Group 1

## FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards on 18 December 1989, after the draft finalized by the Solid Electrical Insulating Materials Sectional Committee had been approved by the Electrotechnical Division Council.

This standard deals with flexible insulating sleeveings. It consists of the following three parts:

Part 1 Definitions and general requirements,

Part 2 Methods of tests, and

Part 3 Specifications for individual types of sleeveings.

This standard ( Part 3/Section 408 ) covers the requirements for glass textile sleeving with PVC based coating, lower breakdown strength.

This standard should be read in conjunction with IS 11654 ( Part 1 ) : 1986 'Specification for flexible insulating sleeving: Part 1 Definitions and general requirements' and IS 11654 ( Part 2 ) : 1986 'Specification for flexible insulating sleeving: Part 2 Methods of test'.

In the preparation of this standard, assistance has been derived from IEC Doc 15C ( C.O. ) 199, Sheet 408 Glass textile sleeving with PVC based coating lower breakdown strength, issued by the International Electrotechnical Commission ( IEC ).

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard***SPECIFICATION FOR  
FLEXIBLE INSULATING SLEEVING****PART 3 SPECIFICATIONS FOR INDIVIDUAL TYPES OF SLEEVINGS****Section 408 Glass Textile Sleeving with PVC Based Coating — Lower  
Breakdown Strength****1 SCOPE**

**1.1** This standard covers the requirements for class E glass sleeving using either braided or knitted construction coated with a continuous flexible coating based on polyvinyl chloride (PVC) or its co-polymers or blends thereof lower breakdown strength.

**2 REFERENCES**

**2.1** The following Indian Standards are necessary adjuncts to this standard:

<i>IS No.</i>	<i>Title</i>
11654 ( Part 1 ) : 1986	Flexible insulating sleeving: Part 1 Definitions and general requirements
11654 ( Part 2 ) : 1986	Specification for flexible in- sulating sleeving: Part 2 Methods of tests
10810 ( Part 53 ) : 1984	Methods of test for cables: Part 53 Flammability tests

**3 DESIGNATION**

**3.1** Sleeving covered in this standard shall be identified as given in **3.1** of Part 1 of this standard. For example IS 11654-3-408—Nominal bore size in mm—Colour code [ as given in **3.2** of IS 11654 ( Part 1 ) : 1986 ].

**4 COLOUR**

**4.1** Sleeving is normally available in the following colours: black, white, red, yellow, blue, green, brown and green/yellow.

**5 REQUIREMENTS**

**5.1** In addition to the general requirements given in IS 11654 ( Part 1 ) : 1986 requirements specified in this standard shall also be applicable.

**5.2 Dimensions**

The sleeving shall comply with the dimensional requirements given in Table 1.

**5.3 Bending After Heating**

When tested in accordance with **13** of IS 11654 ( Part 2 ) : 1986 there shall be no cracking or

detachment of coating visible after bending around mandrels as shown in Table 2 after 96 h at 130°C.

**5.4 Bending at Low Temperature**

When tested in accordance with **14** of IS 11654 ( Part 2 ) : 1986, there shall be no cracking after bending around mandrel as shown in Table 2 while at -25°C.

**5.5 Thermal Stability**

When tested in accordance with Method 'A' in **11** of IS 11654 ( Part 2 ) : 1986 the indicator paper shall not show the change in colour in less than 20 minutes while at 200°C.

**5.6 Resistance to Soldering Heat**

When tested in accordance with **7** of IS 11654 ( Part 2 ) : 1986, the sleeving shall not show sign of splitting.

NOTE — This test shall be applicable for sleeving having nominal bore diameter up to and including 5 mm.

**5.7 Flammability**

When tested applying IS 10810 ( Part 53 ) : 1984, in accordance with **27** of IS 11654 ( Part 2 ) : 1986, flammability shall be minimum 60 seconds. In addition, the indicator flag on these tests shall not be burned away and cotton shall not be ignited by flaming or glowing drippings.

**5.8 Breakdown Voltage**

**5.8.1** Breakdown voltage shall be determined by any of shot bath test given in **21.2** and straight mandrel test; 25 mm electrode in **21.3** of IS 11654 ( Part 2 ) : 1986.

NOTE — The shot bath test must be used for sleeveings with nominal bore diameter more than 3.0 mm.

**5.8.2** The rate of voltage application shall be 500 V/seconds or such that the required breakdown value is reached between 10 and 20 seconds.

**5.8.3** The requirements of breakdown voltage at room temperature elevated temperature and damp heat when measured in accordance with **21.7** of IS 11654 ( Part 2 ) : 1986 shall be as given in Table 3.

**Table 1 Dimensional Requirements**  
( Clause 5.2 )

Nominal Bore mm	Bore Tolerance mm		Wall Thickness	
	Bilateral ( $\pm$ )	Unilateral ( $\pm$ )	Min	Max
(1)	(2)	(3)	(4)	(5)
0.3	0.05	0.10	0.1	0.3
0.5	0.10	0.20	0.15	0.50
0.8	0.10	0.20	0.15	0.50
1.0	0.15	0.30	0.15	0.75
1.5	0.15	0.30	0.15	0.75
2.0	0.20	0.40	0.15	0.75
2.5	0.20	0.40	0.15	0.75
3.0	0.25	0.50	0.20	0.75
4.0	0.25	0.50	0.20	0.75
5.0	0.25	0.50	0.20	0.75
6.0	0.25	0.50	0.20	0.75
8.0	0.50	1.0	0.40	0.75
10.0	0.50	1.0	0.40	0.75
12.0	0.50	1.0	0.40	0.75
16.0	0.50	1.0	0.40	0.75
20.0	0.50	1.0	0.40	0.75
25.0	0.50	1.0	0.40	0.75

NOTE — Only positive tolerances may be used if agreed to between the purchaser and the supplier.

**Table 2 Mandrel Diameters for Bending Tests**  
( Clause 5.4 )

Nominal Bore mm	Mandrel Diameter mm	
	After Heating	At Low Temperature
0.3	2	2
0.6	3	3
0.8	4	4
1.0	5	5
1.5	6	6
2.0	8	8
2.5	10	10
3	12	12
4	15	15
5	18	18
6	21	21
8	27	27
10	33	6
12	40	6
16	6	6
20	6	6
25	6	6

### 5.9 Mould Growth

In case of agreement between the purchaser and the supplier this requirement shall be tested for Scale 1 in accordance with IS 11654 (Part 2) : 1986.

**Table 3 Requirements for Breakdown Voltage**  
( Clause 5.8.3 )

Requirements	Room Temperature	
	Central Value (kV)	Lowest Individual Value (kV)
(1)	(2)	(3)
Shot bath or straight mandrel 200 mm electrode	1.5	1.0
Straight mandrel with 25 mm electrode [ 21.3 of IS 11654 (Part 2) : 1986 ]	2.5	1.5

## 6 PACKAGING

6.1 Provisions of 9.1 of IS 11654 (Part 1) : 1986 shall apply.

## 7 MARKING

7.1 In addition to the details given in 10 of IS 11654 (Part 1) : 1986 following information shall be labelled:

Construction of the sleeving — braided or knitted.

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